

553,245

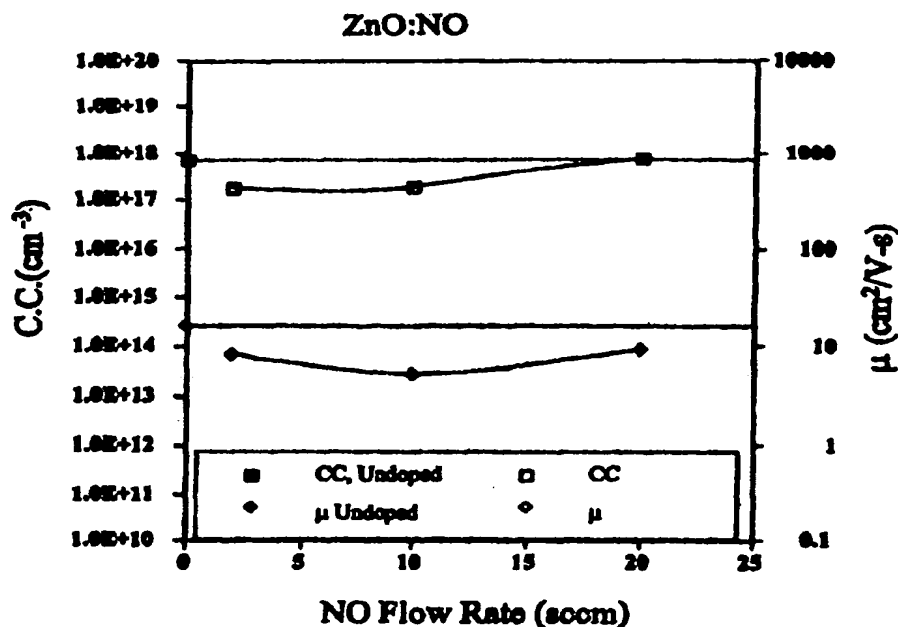
(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
27 February 2003 (27.02.2003)

PCT

(10) International Publication Number
WO 03/017333 A1(51) International Patent Classification⁷: **H01L 21/00**(21) International Application Number: **PCT/US02/11104**(22) International Filing Date: **2 April 2002 (02.04.2002)**(25) Filing Language: **English**(26) Publication Language: **English**(30) Priority Data:
PCT/US01/25874 17 August 2001 (17.08.2001) US(71) Applicant (for all designated States except US): **MIDWEST RESEARCH INSTITUTE [US/US]; 425 Volker Boulevard, Kansas City, MO 64110 (US).**

(72) Inventors; and

(75) Inventors/Applicants (for US only): **LI, Xiaonan [US/US]; 1591 Prouty Drive, Evergreen, CO 80439 (US). YAN, Yanfa [CN/US]; 11888 W. Aqueduct Drive,****Littleton, CO 80127 (US). COUTTS, Timothy, J. [US/US]; 1229 Pomegranate lane, Golden, CO 80401 (US). GESSERT, Timothy, A. [US/US]; 29801 Kennedy Gulch Road, Conifer, CO 80433 (US). DEHART, Clay, M. [US/US]; 4615 west 112th Court, Westminster, CO 80031 (US).**(74) Agents: **WHITE, Paul, J. et al.; National Renewable Energy Laboratory, 1617 Cole Boulevard, Golden, CO 80401 (US).**(81) Designated States (national): **AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.**(84) Designated States (regional): **ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),***[Continued on next page]*(54) Title: **METHOD FOR PRODUCING HIGH CARRIER CONCENTRATION P-TYPE TRANSPARENT CONDUCTING OXIDES**

(57) Abstract: A method for producing transparent p-type conducting oxide films without co-doping plasma enhancement or high temperature comprising: a) introducing a dialkyl metal at ambient temperature and a saturated pressure in a carrier gas into a low pressure deposition chamber; and b) introducing NO alone or with an oxidizer into the chamber under an environment sufficient to produce a metal-rich condition to enable NO decomposition and atomic nitrogen incorporation into the formed transparent metal conducting oxide.

WO 03/017333 A1



Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR,
GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent
(BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR,
NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to the identity of the inventor (Rule 4.17(i)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW, ARIPO

patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

- of inventorship (Rule 4.17(iv)) for US only

Published:

- with international search report
- with amended claims and statement

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.